DOCUMENT RESUME

ED 199 676 CS 005 970

AUTHOR Furukawa, James M.; Sakamoto, Takahiko
TITLE Differences in the Rates of Reading Problems in the United States and Japan: A Search for Causes.
PUB DATE Aug 80
NOTE 15p.; Paper presented at the Annual Meeting of the World Congress on Reading (8th, Manila, Philippines, August 5-7, 1980).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Beginning Reading; *Cross Cultural Studies; *Cultural Differences; *Foreign Countries; Kindergarten; Kindergarten Children; Language Acquisition; *Reading Difficulties; *Reading Instruction; *Reading Research; Reading Skills; Vocabulary Development
IDENTIFIERS *Japan

ABSTRACT

It is estimated that approximately 15% of the school children in the United States have reading problems, while only about 1% of students in Japan have such difficulties. A joint study was conducted by researchers in the two countries to identify possible causes for this difference. Subjects were 61 Japanese kindergarten students in an urban school and 57 American kindergarten students from low socioeconomic backgrounds. The students were administered (1) a cognitive processing capacity test, (2) a letter/hiragana knowledge test, (3) a letter discrimination concepts test, and (4) a number concepts and principles test. The results showed that the Japanese students scored higher than the Americans on all four measures. The findings support the position that the incidence of reading difficulties in the United States may be attributable to a failure to provide adequate instructions. The findings suggest that adequate instructions, perhaps in the form of a model of teaching, may be one way of reducing reading difficulties in the United States. (FL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED199676

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☐ This document has been reproduced as received from the person or organization originating it.
☒ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

James M. Furukawa
Psychology Department
Towson State University
Towson, Maryland 21204
Takahiko Sakamoto
Noma Institute of Educational Research
Kodansha, Otowa 2-12-21
Bunkyo-ku, Tokyo, Japan

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
James M. Furukawa
Takahiko Sakamoto
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Differences in the Rates of Reading Problems in the United States and Japan: A Search for Causes

Eighth World Congress on Reading

Children in the United States apparently have more reading problems than children in Japan. Gibson and Levin (6) estimated that at least 15 percent of the children in the United States have reading problems. Makita (7) reported the incidence of reading difficulties to be about 0.98 percent of the school population of Japan. A joint study was conducted by researchers in Japan and the United States to identify possible causes for the differences in the reported incidences of reading difficulties. The findings will be described in this paper.

There are several possible sources of reading problems. Among the causes of "dyslexia" listed by Vernon (12) are neurolo-

CS005970

gical impairment, maturational lag of the cerebral cortex, and hereditary factors. Robeck and Wilson (9) attribute reading problems to: (a) slowness in mental functioning, (b) emotional upset or instability, (c) impoverished language background, and (d) specific skill deficits in such areas as auditory discrimination, visual differentiation, word analysis, and sequencing. Furukawa and Sunshine (4) found that there was a substantial correlation between cognitive processing capacity (CPC)(2) and comprehension (r = .43) and CPC and vocabulary (r = .50) on the Iowa Test of Basic Skills. They also found a substantial correlation (r = .51) between Furukawa's letter discrimination concepts test and CPC. Samuels (11) stated that the "adequacy of instructions" may be a cause of reading problems. One of his concerns appeared to be the sequencing of the steps in learning to read--from simple to complex as in Gagné's (5) classes of behavior.

Sakamoto (10) said that beginning reading probably does not pose a problem in Japan because: (a) hiragana, the Japanese syllabary, is easy to learn since there is a sound-symbol correspondence; (b) parental concern, especially the mother's, is shown over the development of reading by the children; and (c) publications for preschool children are numerous and of excellent quality. Sakamoto's inferences are supported by Makita (7), at least on the point of symbol differences favoring the Japanese script. Muraishi (8) appeared to disagree on the influence that parents have on the children but inferred, instead, that children may acquire letters themselves because of a social environment that encourages such learning. He did say, however, that language

development is hastened through preschool education.

While the analysis of the possible sources of reading problems and reasons for the cross-cultrual differences in the incidence of reading problems suggested many possible research areas, this study selected the following questions for investigation.

(1) Is there a difference in CPC test scores?

(2) Is there a difference in the rates at which American and Japanese students master letter/hiragana knowledge (to be referred to jointly hereafter as letters)?

(3) Is there a difference in readiness to learn letters as measured by Furukawa's test of letter-discrimination concepts?

(4) Is there a difference in the knowledge of number concepts and principles as measured by Furukawa's number concepts and principles test?

Since differences are to be expected based on the available data, a fifth question was asked: Can the difference in letter knowledge be eliminated by "adequate instructions"? "Adequate instructions" in the present study meant the application of a CPC model of teaching and studying.

Before examining these questions, it was necessary to recognize and compensate for several cultrual distinctions between the two countries. For example, there are 26 letters in the English alphabet, but there are 46 basic symbols in the Japanese syllabary. This problem was resolved by randomly selecting 26 Japanese hiragana for inclusion on a test of "letter knowledge." Also, the syllabary, unlike the alphabet, has a virtually complete

symbol-sound correspondence--the "name" of a letter is the same as the sound (e.g., あ is the short a sound as in American and is also named a). Despite these differences, being able to discriminate between one hiragana and another requires the same kind of knowledge (e.g, of "straight lines," "curved lines," and other such concepts) as does recognizing letters of the English alphabet.

A second cultural distinction lies in the school terms of the two countries. The Japanese school year begins in April, whereas the American school year begins in September. Therefore, there was a possibility of biasing the study by either chronological age or amount of prior formal teaching at the time of testing. To resolve this possibility, the children in the United States were tested in October (one month after the beginning of school) and again in May. The Japanese children were only tested in May (one month after their kindergarten year began). Regardless of this procedure, the time-in-school factor was not equivalent. To explain, Japanese parents can opt to place their children in kindergarten for one- to three-year terms. During these years, the children are exposed to a curriculum which covers six areas: health, society, nature, language, music, and arts and crafts.

A third cultural factor involves the pictures used in the CPC test (to be described in detail later). For example, a football is a commonly available object in the United States but not in Japan. Therefore, the CPC tests were modified slightly to consist of similar but common items for children of each country.

Furukawa and his colleagues (3) found that it was possible to increase reading (decoding) skills by as much as 100 percent for first graders. They used a CPC model of teaching and studying consisting of three basic elements. First, children were asked to learn units of information in quantities that did not exceed their CPC, as measured by Furukawa and Sunshine's test (4). Second, the units of information were organized in a pyramidal format which considered the sequential and hierarchical organization of reading materials and the CPC level of the children. Third, based on the pyramidal structure of knowledge, a higher order concept or principle in the pyramid was used as a heading to tie together all lower-order facts, concepts, and principles in quantities that did not exceed the children's CPC. To illustrate the use of this model in teaching letters of the alphabet, children are first taught letter features and how to combine them into letters, the letters are combined into words, and the words are combined into a sentence ("The quick brown fox jumps over my lazy dog."). In teaching letter features and letters, no more than three are taught at any one time since this is the average CPC of kindergarten and first grade children.

Subjects

The selection of subjects was based on an attempt to magnify the differences that may exist between the children of the two countries. Therefore, the 61 Japanese kindergarten children were chosen from a city because their knowledge of hiragana is reported to be higher when compared to children from other geographic areas (10). In contrast, the 57 American children were

all from a low socioeconomic group (reported median family income was $3,150 in 1976). The American kindergarten children were in four separate classes: Two classes (Group A) were tested in May of an earlier school year than that of the other two classes (Group B) and the Japanese children.

Tests

The kindergarten children in Group A were only given a CPC test and a letter knowledge test. Group B and the Japanese children were given four tests: CPC, letter discrimination concepts, letter knowledge, and number concepts and principles.

A brief description of each test follows.

(1) The cognitive processing capacity test was referred to in the original paper by Furukawa and Sunshine (4) as a visual short-term memory test. It was subsequently renamed because of the possibility that it is a measure of levels of processing and because of the unsettled nature of the dual-storage memory theory. This test consisted of 25 pictures on 35 mm slides presented by timed devices. First, a set of five pictures was shown at the rate of 2 seconds each, and the child was asked to name the objects seen (e.g., socks, lamp, etc.). This was a practice set to determine whether the child understood the instructions. Next, a set of 10 pictures was shown, and recall was tested. This process was repeated with a second set of 10 pictures; the average recall on both sets became a child's CPC score.

(2) Furukawa's letter knowledge test was composed of 26 lower case letters. The Japanese version developed by Sakamoto consisted of 26 randomly selected hiragana. The "letters" were presented in groups of three since the average CPC of the kindergarten children in the United States appeared to be about

three (4).

(3) The letter discrimination concepts test developed by Furukawa consisted of 20 sets of visual displays. The children were asked to select, for example, a circle from among a circle, a square, and a triangle (a group of three items). The concepts tested were those that teachers in Japan or the United States might normally use in describing letters.

(4) Furukawa's number concepts and principles test consisted of concepts (e.g., "more," "less," and numbers) and principles of addition and subtraction.

Results

The results for the American children in Groups A and B and the Japanese children are shown in Table 1. The data will be

---

Insert Table 1 about here

---

considered in the order in which the tests were described earlier.

The CPC test scores showed that the American children, as a whole, scored significantly lower, F (1, 115) = 8.29, $p < .01$, than the Japanese children. The differences for Group B were slightly greater at the time of entry into kindergarten than at the time of completion (i.e., October versus May).

On letter knowledge, the Japanese children tested in May were superior to the American children in Group B tested in October, F (1, 94) = 85.32, $p < .001$. The difference was not significant, however, when the children were both compared on the May test - after the American children in Group B were taught during the interval between tests by teachers using the CPC model of teaching (3). A comparison was also made with the letter know-

ledge of the children in Group A (composed of children who were in kindergarten in May of an earlier school year). The Japanese children were also superior in letter knowledge to the American children in Group A, F (1, 113) = 18.30, $p < .001$. The difference between the two American groups favoring Group B was also significant, F (1, 113) = 9.82, $p < .001$.

The letter discrimination concepts test showed significant differences, F (1, 94) = 83.01, $p < .001$, in favor of the Japanese children over Group B children when the latter were tested in October but not in May.

Finally, the number concepts and principles test comparisons were all significant at the .001 level and favored the Japanese children.

To establish the degree of relationship between tests, a number of correlations were calculated. First of all, it should be noted that none of the regression analyses were significant for the tests conducted in Japan. For the kindergarteners in Group A, there was one significant correlation, r (29) = .58, $p < .01$, between the letter discrimination concepts test and letter knowledge test. There were several significant correlation coefficients for the Group B children.

(1) Letter discrimination concepts and letter knowledge tests for October: r (27) = .52, $p < .01$.

(2) CPC and letter knowledge tests for May: r (27) = .36, $p < .05$.

(3) CPC and number concepts and principles tests for May: r (27) = .41, $p < .05$.

Discussion and conclusions

The results tended to shed some needed light on cross-cultural differences in the incidence of reading difficulties. The mean scores of the CPC test all favored the Japanese children. However, the mean of Group A, unlike the means of Group B, did not differ significantly from those of the Japanese children. As for the advantage of the Japanese children, the CPC scores, as well as the other test scores, did not correlate significantly with any of the others. This lack of a significant correlation indicates that the Japanese children were all learning equally well despite the CPC and other variations. When the Group B children's test scores were subjected to regression analyses, the correlation between CPC and letter knowledge while not significant in October was significant in May. Nevertheless, the coefficient was a low one ($r = .36$). This relationship may be indicative of an influence that CPC has on learning. Furukawa (1, 2) has found ample evidence that this is true, with higher coefficients being found when the learning tasks were of greater "difficulty" (i.e., greater in number). Precisely how this effect is exerted and how it can be eliminated needs further study.

In the final analysis, the differences between the CPC scores of the children in the two countries need to be interpreted very conservatively. The reasons for this caveat include the small sample, the fact that the tests differed somewhat in content and were administered by different persons, and the finding that differences were minute despite the effort to magnify the differences through choice of subjects. Finally, the letter knowledge test, which showed no significant difference indicates that the

effect of CPC, if any, need not be a handicap.

With regard to the second question, if the American children are not taught properly, the findings show that differences are found in the rate at which letters are mastered. The magnitude of such a difference at the initial stage of reading can be exacerbated as the years go by. For example, the Group A children were found at the end of first grade to be able to read only 40 percent of the vocabulary selected randomly from their readers in comparison to 80 percent for a group of first graders who were taught by the CPC model in kindergarten and in first grade (3).

The answer to the third question on differences in readiness to learn letters, as measured by the letter discrimination concepts test, is also affirmative at the beginning of the year but not at the end of May. As expected, the correlation between letter discrimination concept test scores and letter knowledge test scores decreased from October to May. The substantial correlations suggest that the letter discrimination test may merit further consideration by reading specialists as a diagnostic and remedial tool. Apparently, the knowledge of such concepts as "straight," "right," and "left" is related to the acquisition of letter knowledge.

The Japanese children were superior to the American children on the number concepts and principles test. If the findings in the area of letter knowledge can be generalized to numbers, then there may be a failure in teaching arithmetic in the United States, at least at the school where this study took place. Although the children in Group B did improve during the school

year, they did not attain the level of the Japanese children. A further study should be conducted to collect evidence on the viability of the CPC model in teaching arithmetic.

The answer to the fifth and final question, on eliminating letter knowledge differences through "adequate instructions," seems to be a positive one. The findings appear to indicate that the CPC model of teaching may provide the type of instructions that can assure American children of success in reading.

A difference in letter knowledge was found at the beginning of the kindergarten year and in May for the American children in Group A who were not taught by use of a CPC model of teaching.

The conclusion, suggested by the evidence presented here and elsewhere, tends to support Samuels' (11) position that the incidence of reading difficulties in the United States may be attributable to a failure to provide "adequate instructions." The data may also provide some support for Sakamoto's (10) position that hiragana is easy to learn, Japanese parents are concerned over the development of reading by their children, and Japanese publications for preschool children are both numerous and of excellent quality. Taken in toto, nevertheless, the evidence seems to suggest that "adequate instructions," perhaps in the form of a model of teaching, may be one way of reducing reading difficulties in the United States. A closer scrutiny of American teaching practices in arithmetic is also suggested.

Table 1. Test Means and Standard Deviations

Children Tested	Type of Test: CPC	Letter Knowledge	Letter Discrimination	Number Concepts and Principles
United States				
Group A (May)	3.77*	22.12		
	.75**	5.64		
Group B (Oct)	3.21	16.11	14.03	14.43
	.76	7.69	3.01	3.33
Group B (May)	3.41	24.50	17.61	17.21
	.85	2.90	2.25	2.54
Japan (May)	4.16	25.49	18.40	19.11
	1.23	1.56	1.67	1.82

*mean score

**standard deviation

References

1. Furukawa, James M. "Chunking Method of Determining Size of Step in Programmed Instruction." Journal of Educational Psychology, 61 (1970), 247-254.

2. Furukawa, James M. "Cognitive Processing Capacity and Learning-Mode Effects in Prose Learning." Journal of Educational Psychology, 69 (1977), 736-743.

3. Furukawa, James M., Christine A. Rieger, Linda Sobotka, and Dianne Thomas. "Teaching Reading to Kindergarten and First Grade Children: Two Years on a Chunking Diet." Paper presented at the meeting of the International Reading Association, Maryland Council, February 1980.

4. Furukawa, James M., and Phyllis M. Sunshine. "Visual Short-Term Memory Test for Non-Readers and Readers." Paper presented at the meeting of the American Psychological Association, San Francisco, California, August 1977.

5. Gagné, Robert M. The Conditions of Learning. New York: Holt, Rinehart and Winston, 1977.

6. Gibson, Eleanor J., and Harry Levin. The Psychology of Reading. Cambridge, Massachusetts: MIT Press, 1975.

7. Makita, Kiyoshi. "Reading Disability and the Writing System." New Horizons in Reading. John E. Merritt (Ed.). Newark, Delaware: International Reading Association, 1976.

8. Muraishi, Shozo. "The Reading Ability of Preschool Children in Japan." New Horizons in Reading. John E. Merritt (Ed.). Newark, Delaware: International Reading Association, 1976.

9. Robeck, Mildred C., and John A. R. Wilson. Psychology of Reading: Foundations of Instruction. New York: John Wiley and Sons, 1974.

10. Sakamoto, Takahiko. "Beginning Reading in Japan." Growth in Reading. Derek Thakery (Ed.). United Kingdom Reading Association, 1979.

11. Samuels, S. Jay. "Reading Disability?" The Reading Teacher. 23 (1970), 267-283.

12. Vernon, M. D. Reading and Its Difficulties. Cambridge, London: Cambridge University Press, 1971.